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Message in a Bottle

The use of intermediary objects to convey future emotional intentions during a multi-disciplinary design project

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Abstract: In this paper we describe a recent design research investigation, highlighting ways in which a designer attempts to communicate to others their intentions regarding users' emotional responses to future artefacts through the use of intermediary objects during design activity. We follow the interactions of a jewellery designer engaged in a project in partnership with an electrical engineer, a software developer, and museum curators. The overall design goal is to create an aesthetically desirable electronic object for use in a specific museum context, allowing the generation of personalized labels. This paper embraces an ethnomethodological approach to uncover ways the jewellery designer attempts to translate an intended emotional state (appeal and desire) towards the designed artefact in the future context, through intermediary objects, which are interpreted differently by different people across the trajectory of design activity. The use of intermediary objects during sociotechnical interactions in engineering design activity is well documented (Vinck and Jeantet, 1995, Boujut and Blanco, 2003, Eckert and Boujut, 2003) but our research suggests more work is required to understand the role that these types of devices play in intending and interpreting future emotional content, which is seen as a significant goal within product design disciplines. We discuss the concept of difference, and how it is managed during design activity involving various actors and actants, leading towards a better understanding of intention and interpretation during design.

Keywords: design activity, design process, affective design, design intention, designer interaction

1. INTRODUCTION

This paper provides an account of a group of creative professionals involved in a design project aimed at developing and prototyping an ornamental technical device for a museum context. The technical device is part of a system that enables the custom generation of exhibit labels as visitors walk through a museum exhibition visiting different artifacts on display. The aim of this research paper is to build a better understanding of how a designer makes use of physical prototypes to share her intentions and interpretations regarding

overall affective and emotional attachments to a final artifact intention, which is yet to be developed, in partnership with a wider creative team. The researchers observed the interactions between the group directly involved in the design assignment to determine how boundary objects are deployed, used and interpreted in different ways amongst different team members.

All project partners observed, to varying degrees, considered themselves designers: the academic Co-Investigator, responsible for project management of product design development; the jewellery designer, with responsibility for the design and plan of the circuit casing; the electrical engineer, responsible for the design and delivery of the technical circuit; a software developer responsible for development of a mobile application which connects to the server side application responsible for generating the customized labels throughout the museum exhibit; and finally, the ethnographic design researcher who is involved in field testing of the system in the wild in various museum contexts. Outside of this core group are the museum curators and directors who have been invited to participate in a focus group towards the end of the project to provide feedback on the robustness of the technical platform, the value of custom labeling to their relevant museums, and their overall aesthetic appeal the artifact presents as a museum souvenir structured around the interactive gallery experience.

The majority of the team has not worked together before. There is no significant history of this group being collectively engaged in design activity together. This suggests that there are no preconceptions, or shared experiences with team members, and thereby no prior knowledge or understanding of each other's intentions, or approaches to working. Assembled in this way, the team is required to explain or detail decisions to the rest of the team early in the design processes, in order to ensure a common approach can be found. This scenario is ideal for the research observation, since it is not clear how any particular member of the team will respond to the set brief, and explicating personal understanding will be required.

The co-investigator responsible for product design development is also the lead author of this paper. It was established early in the project that product design activities would be delegated to the jewellery designer, but it remained the responsibility of the co-investigator to retain project management in partnership with the lead project team. All design project partners were made aware of the research focus of the co-investigator as a design observer. Project partners were also enlisted as observation participants at the early stages of the design project, to solicit their responses to the product design intentions of the jewellery designer in response to the overall project brief established by the Principal Investigator prior starting the design activities. The design brief does not contain any explicit suggestions about product design development, and the jewellery designer was asked to provide prototype samples that addressed colour, material and finish (CMF) as she understood would be relevant to the project intentions.

1.1. Boundary objects in the design process

The prototypes and samples presented by the jewellery designer are considered here to be boundary objects (Star and Griesemer, 1989) within the overall process of design activity, where the prototype possess a clear identity for individual actors, but remains flexible and ambiguous enough in their identity to accommodate a variety of interpretations across multiple actors working together across networks. We refer to two types of boundary objects observed in this project. Conscription devices (Henderson, 1991) are seen as artifacts used during design activity which enlist participants to think and work towards a common goal in a participatory environment. Intermediary objects (Vinck and Jeantet, 1995) are artifacts which work as representations of final, absent object at an intermediate state. They are understood as objects used to communicate and exchange ideas and intentions between partners involved in design activity about future states, as well as foster co-operation within design teams working on common goals concerning future states (Eckert and Boujut, 2003, Boujut and Blanco, 2003).

Conscription devices and intermediary objects can take a variety of forms, including drawings, sketches, models and prototypes. We argue that physical artifacts, when presented as prototypes, can be understood as boundary objects of both types described

above, but are unique from other forms of boundary objects in that they are simultaneously representational artifacts concerning future intentions, while also being non-representational by virtue of their presence during design activity. This dual nature of physical prototypes is also related to their intended (and presented) social, technical and material affordances. It remains unclear in what ways a physical prototype, when operating as a boundary object regarding a future intention, is able to represent intentional future affective attachment, in relation to an object that is not yet realized.

1.2. Project overview: Talisman

Talisman is the name of the design project under observation. The overall intention of the Talisman project is to enhance the visitor experience to a non-specific museum exhibition through the generation of custom digital labels at artifact displays.

Talisman is a small wearable device that contains an integrated circuit that utilizes Near Field Communication (NFC) through a Bluetooth protocol, to enable communication and notifications with devices using Apple's iOS7 operating system. As the visitor approaches an artifact in the exhibition context, the Talisman device notifies an iOS device of its presence, and the iOS device communicates with a server side application that generates descriptive label text using an algorithm based on natural language processing. Descriptive labels are returned to the iOS device for presentation, and are customized according to the route each visitor takes in engaging or visiting various artifacts, creating the impression of a degree of personalization. The experience is intended to work automatically without the use of buttons or other physically interactive media.

The overall intention of the Talisman is to be both a passive technical device, interacting with computer hardware behind the scenes, while also being an aesthetically pleasing and a positive reminder of the visitor's experience engaged in the museum exhibition. As a result, the project was structured into three key areas: hardware development, responsible for the Talisman circuit design; software development, responsible for the technical code for information exchange between Talisman, the iOS device and the server side application, and; product design development, responsible for the hardware casing and the overall aesthetic of the Talisman device.

It was clear that any smartphone would be capable of fulfilling all functional and technical requirements outlined in the design brief. A secondary design intention was to create a "heads up" experience, preventing the need for visitors to make use of their own phones, but rather to immerse themselves fully in the museum experience. In early project discussions, it was believed that the affective experience of the museum visit might be enhanced if the Talisman device were described as a wearable item, which might also serve as a souvenir, a memory of the event that had created some sense of value through the experience. For this reason, it was decided to invite a jewellery designer to participate as a member of the overall design team, since it was anticipated that a jewellery designer might possess a degree of expertise regarding wearable objects that held value.

The structure of the project suggests that two key indicators of Talisman's performance will require assessment during overall development; namely, the technical performance of the hardware and software during use, and the affective, aesthetic performance of the Talisman device when engaged by the user, ensuring it remains an object that creates a positive and pleasing means to deliver the technical functions.

There is a degree of overlap of team members across these three areas of activity; for instance, one member of the software team works closely with the electrical engineer involved in the circuit design to ensure signals from the circuit correctly interface with the server software, while the electrical engineer also works closely with the jewellery designer to discuss dimensions, technical restrictions, and other necessary knowledge impacting development of the casing structure. All team members are involved in weekly meetings to update the full project team on the respective progress of their activities.

1.3. Affective Design, multiple views

This paper is intent on describing how the project team involved in the various design activities intends to share their understanding regarding a positive affective experience for each museum visitor using the final designed product through physical prototypes as boundary objects during intermediary stages of design activity.

Norman (Norman, 2005) describes three levels of affective design responses that people normally exhibit when interacting with objects. At a rational level, people are able to discuss the concepts behind the artifact, to describe their understanding of the intentions that the designers were attempting to address in the overall product design and development. At a behavioural level, people generally respond to the overall performance or utility of the object, describing how well an object serves its suggested purpose. At the visceral level, responses are generally pre-cognitive, and people display a more emotional response to the overall form and shapes, exhibiting their personal preferences or tastes prior reflective analysis of their understanding of the object.

The author engaged participants in the early phases of project work, in an attempt to uncover how each team member, each with different backgrounds and experiences, would understand the proposed product direction when engaged with the early prototypes at the rational, behavioural and visceral level of interaction. The research observations form part of a separate research project outside the scope of Talisman, reported here as a case study. Capturing initial thoughts from all team members before any significant interactions occurred between them was considered advantageous in understanding individuals' initial understandings of the project, prior input from other team members, while also capturing how each individual participant interpreted the overall design trajectory in regards to its affective intentions through presented prototypical artifacts.

The jewellery designer was asked to interpret the design brief and provide some prototypes and samples that would start to communicate her design intentions surrounding the final design specifications. The jewellery designer was informed that she was able to interpret the brief as she felt necessary, and given creative control and direction of the aesthetic decisions. She was trained in a programme that has a strong emphasis on materiality, and her area of expertise involves technical processes of casting simple materials, such as resins, polymers, epoxies. For this particular project, a new material called Jesmonite® was selected for use.

2. RESEARCH METHODOLOGY

Typically, an affective design methodology requires a large sample size in order to construct a meaningful understanding of the affect participants describe concerning an artifact (Nagamachi and Lokman, 2011). The use of large sample sizes is to ensure that any deviation, or individual differences, might be minimized or made irrelevant. Collecting data in such a way is most relevant to very large design projects, such as automotive or consumer electronics. Many design projects, particularly those involving small and medium enterprise, rely on small design teams to deliver results quickly, and often the affective dimension is interpreted through the experience of the designers involved. Deadlines for production are short, volumes for production are small, and access to the final target group can be difficult.

As a design project, Talisman fits the latter description, involving a small design team that has limited access to the final end user and limited time in order to develop the final product. However, the aim of the research observation described in this paper was not whether the designer captured the affective dimension intended in the final product delivered; rather, how a designers' intentions during design activity are conveyed to others in the network through the use of physical objects and prototypes. With respect to Talisman, it remains unclear how a designer can successfully convey a positive affective experience regarding a future state through an ambiguous boundary object.

The design research observations were structured around methods involving participant observation and semi-structured interviews. All interactions were recorded using standard video recording equipment, and a stand-alone audio recorder was also employed for backup purposes. Each discussion with relevant team members lasted approximately 15 minutes in total. All audio recordings were transcribed and analyzed in textual format.

Rather than constructing Likert scales for understanding the semantic differential space (Snider and Osgood, 1969), each participant was encouraged to speak freely about their experiences with the artifacts presented to them. A corpus was created and analyzed structured on ethnomethodological techniques associated with conversation analysis

(Hutchby and Wooffitt, 2008) using an appropriately constructed and validated coding scheme in order to identify key themes emerging from each participant's individual account, and compare any commonalities or differences in perception and interpretation.

Our research observations began with the jewellery designer presenting her intermediary prototypes. She described what she believed was an appropriate response to the design direction set in the brief. She was asked to describe the objects presented, to outline her intentions regarding the final design specifications, and how she understood these artifacts to be representative of jewellery objects. The objects presented to each of the participants are captured in Figure 1.



Figure 1: Boundary objects used to elicit an affective response

The objects presented were of various dimensions, but all could be described as being hand held, or wearable, each no more than approximately 100 cm³.

Following the designers descriptions and rationale for presenting the collection of objects, individual team members were asked to interact with the same series of intermediary prototypes created by the jewellery designer, prior any meetings with other team members. Three questions were asked of the remaining team members while interacting with the intermediary prototypes:

- Could you describe the objects in front of you?
- Could you describe the designer's intention regarding these objects?
- Would you describe these objects as pieces of jewellery?

2.1. Results

The jewellery designer described her intermediary prototypes as studies in material. She outlined her design intention was to generate an artifact that resembled a pebble or stone, which had the circuit design embedded into the Jesmonite® material which has a tactile quality similar to stone. In her description, she outlined that she had interpreted the design brief into the pebble artifact because of the affective experience that she perceived most people had with pebbles, particularly found during walks on beaches. She believed that the affective quality of "finding the right stone", feeling it, and holding it in the hand were affective elements she wanted to capture which maintained the "heads-up" approach to the project. She also outlined that in attempting to understand what affective elements were related to desirable souvenirs, she felt that pebbles, once found, were often kept and collected for their affective quality and value, rather than their economic or functional value.

At a later date, the same intermediary prototypes were presented to the electrical engineer. The total discussion time was over 17 minutes. The research observation team asked the three questions outlined in the research methodology above. In response to the first question, the engineer immediately began to discuss perceived functions associated with the objects: "...that feels like something you use, to keep something in your wrist, like a remote kind of thing ..." (0:00:38/0:17:20). Continuing with the various objects presented, the engineer continues to describe the artifacts relating to perceived function, rather than material or mode of construction: "...I'd have to say pencil holder, I dunno, that's just what

comes to my mind when I see this." (0:00:57/0:17:20); *"...I'm sorry, I'm thinking of common objects again and this reminds me of a chopstick holder..."* (0:02:11/0:17:20); *"...this kind of reminds me of a tea cozy..."* (0:02:36/0:17:20). When asked if the objects presented to him could be described as jewellery, the participant responded: *"...well I don't see why not. Uhm, though they are kind of, they feel a little bit on the boundary of ... so like, some of these are not obvious how they would be used as jewellery. So they don't have the kind mode of attachment, if you like..."* (0:09:29/0:17:20). When asked about the designer's intentions regarding the artifacts, the participant noted: *"... in some sense it seems like an exploration of the boundaries of the traditional concepts of jewellery..."* (0:15:57/0:17:20), and continuing: *"...it's not obvious how these would be used as jewellery. Though with this ones, uhm, I mean they have this kind of similarities to something, like, a lot of people like having a stone that they've picked up at the beach..."* (0:16:15/0:17:20).

The same artifacts were presented to the lead software developer, and the same three questions were asked as outlined above in the research methodology. Total length of this discussion was just over 8 minutes. In this instance, the participant in question was quick to identify the material as a strong salient feature, but only after mentioning the lack of technical functionality present in the artifacts: *"...I guess I see a collection of different objects, shaped objects. They all seem to be, uh, inert. Don't seem to be any kind of electronics or anything. Some of them seem to be made of stone-like material..."* (0:00:33/0:08:38). While physically engaging with a number of the artifacts, some other elements are discovered which clearly generate a positive affect with the participant: *"...oh, look, that's actually – oh hey, magnets. That's obviously trying to do something functional, but I can't quite work out what it is though..."* (0:01:43/0:08:38). Eventually, the participant decides to cluster the artifacts into categories that allow him to build a deeper understanding of the task he's involved with: *"...they certainly look like, I guess these look like stones. That one looks like a bit of worked stone..."* (0:02:05/0:08:38). When asked if the objects presented to him could be described as jewellery, the participant immediately responded: *"...uh, I wouldn't. But then my view of jewellery is very narrow."* (0:03:49/0:08:38). When asked to speculate on the designer's intention of the prototypes presented, the software developer replied: *"...I find it easy to speculate on the intention of these. These seem to be trying to, uhm, take qualities that you associate with a natural stone ..."* (0:05:37/0:08:38).

The ethnographic design researcher was also asked to participate in the study, since she would be involved in field trials with the artifacts at identified testing gallery sites at a later date on the project. Total discussion time was approximately 9 minutes. In attempting to describe the objects, her immediate response was: *"...a mixture of pebbles, and black artifacts ..."* (0:00:29/0:08:52). Slightly later, prior being asked the third question, she also states *"... they also slightly remind me of jewellery."* (0:01:48/0:08:52). At a later time, the researcher asked the participant to expand on this statement, and describe why she felt the intermediary prototypes reminded her of jewellery. She states: *"... ehm, I think cause they're all kinda like pretty, in a way...I guess it's like the smoothness of them, that makes me think they'd be quite good as wearables. But I think it's cause I like jewellery and I sort of see everything as 'Oh, I could wear that'..."* (0:04:46/0:08:52).

When asked to describe what she understood the designer's intention to be, the design researcher states: *"...it looks the ultimate aim is to make something that you can hold in your hand and is quite tactile...they don't really look as if they are just meant to be looked at... they look as if they are supposed to be held ..."* (0:06:15/0:08:52).

3. DISCUSSION

Though our research findings make evident that the rational intentions associated with the pebble concept initially outlined by the jewellery designer was clear to all participants, the transcriptions suggest that there are other considerations that need to be taken into account when working with boundary objects during design development that are intended to represent ambiguous future states. We discuss below four particular issues relevant to an affective design project involving inter-disciplinary teams. Notably, all four issues involve the role of difference across various elements within the interactions between participants and prototypes.

3.1. Differences among participants

In the interdisciplinary team we describe in our project, the differences between participants, both in their personal world views and their individual biographies is significantly accentuated, due to the small sample size of the group. One key difference is that the jewellery designer and the design ethnographer are women; our two engineers are men. The descriptions provided suggest that a difference in understanding and interpretation is evident between the women and the men. We suggest that this difference is amplified by the presence of the intermediary object, but the intermediary objects presented also enable participants to manage difference since clarification of interpretation and intention is made readily possible through concrete means.

3.2. Ambiguity of intermediaries: differences in interpretation

The traditional approach involved in an affective design methodology is to engage a large sample size with artifacts and objects that are fully formed. The objects normally presented are precedent objects, already in fully formed existence on the consumer market. Design researchers involved in affective design methodologies will normally place restrictions upon the survey target they are addressing in determining the affect in order avoid unnecessary confusion in their analysis (Nagamachi and Lokman, 2011). Such an approach may provide insight into how a target audience of consumers necessarily feels about an existing product, which is clearly defined, categorized, and not ambiguous. Intermediary prototypes used across design teams are not full manifestations of the final design intention, but an incremental representation between the precedent state and the final design intention (Boujut and Blanco, 2003, Vinck and Jeantet, 1995). Intermediary objects are highly ambiguous, open to differences in individual interpretation, as the intermediary object reveals and implicates particular information relevant to the interpreter (Eckert and Boujut, 2003). Our analysis reveals that the ambiguity would appear to emerge as a result of variety of interpretations possible in the presence of the objects and other designers. In attempting to ascertain the designer's intentions, our three participants were clear on the rational intentions that the prototypes were trying to convey (stones and pebbles), but less clear on the behavioural intentions (how does one interact with or use the pebble as an electronic device?). It is not clear how the visceral responses reported by all participants are related to the artifact presented, or anticipated concerning the future manifestations which are intended to emerge later in the design trajectory.

3.3. Semantics and meanings – differences in understanding

Across the Talisman project, a standard definition of jewellery was not provided in relation to the final design decision regarding final artifact development. In early briefing meetings, it was suggested that the final device should be considered a souvenir, create a sense of "value" and also be "wearable". This was collectively interpreted to fit within a scope of jewellery, in its widest sense, and to this end, an expert designer of jewellery was invited to participate. What appears in our reports is difference in collective understanding of what "jewellery" is. The designer interpreted the brief to be about value of experience, and attempted to parallel the gallery experience to the act of collecting pebbles on the beach. From that, the designer suggested that "wearable" could be also understood as "handheld", and interpreted jewellery not as a brooch, pendant or bracelet, but rather a handheld device, which addressed the designer's understanding of facilitating a "heads up" experience in the museum context.

The electrical engineer, and the software programmer reported having difficulties in understanding the intermediary objects presented as subscribing to a definition of jewellery for different reasons. The engineer made extensive use of analogy in describing the intermediary objects, none of which were related to jewellery. The software programmer was not able to categorize the intermediary objects as electronic devices, outlining that they seemed too "inert", while also professing that his view of jewellery was "very narrow". In the conversations with the design ethnographer, her early response of viewing the intermediary objects as jewellery was predicated on her view that she interprets many things as potential types of jewellery.

3.4. Shared affective experience – differences in connections and relations

All participants were quick to understand the metaphorical connotation of pebbles through the intermediary objects presented by the designer. The rational understanding of the experience of walking along a beach and collecting stones considered aesthetically pleasing to both eye and hand, was mutually agreed. However, this analogy was not necessarily transferred to the intended activity of the end user in the final design intention; that is, no participants were able to articulate an understanding of the desired transference of visceral experiences from one activity (walking along the beach and collecting precious stones as souvenirs) to the intended activity (walking through a museum with a precious electronic stone, which is a souvenir). Though the boundary object was able to operate effectively at a rational level, it remains unclear whether it does so equally well at a visceral level.

4. CONCLUSIONS

This paper highlights that communicating affective intentions presents challenges in small, interdisciplinary design projects, because difference plays a prominent role across the project team, both at the individual level and the level of understanding and interpreting intentions of other group members. Intermediary objects, shown to facilitate communication and cooperation across design teams, are ambiguous by nature, and we suggest that their ambiguity is a result of differences in interpretation by individual actors. Difference occurs on three distinct levels, following from Norman (Norman, 2005): difference at the visceral level (the object's affect); difference at the behavioural level (the object's performance); and difference at the rational level (the concepts relating to the object). However, difference also occurs when participants are not clear on which level (visceral, behavioural, rational) other team members are interpreting the intermediary prototypes, since affective responses can occur across all three, and individuals place differing levels of importance on each of these levels.

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